

AI Literacy and Digital Citizenship Competence of Senior High School Social Studies Students in Sta. Rosa City: Basis for a Technology-Driven Civic Learning Framework

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Abstract— This study aimed to assess the AI literacy level and digital citizenship competence of Senior High School Social Studies students in Sta. Rosa City, Laguna, and to examine the significant relationship between these two variables. Specifically, the research sought to measure students' AI literacy across three dimensions – knowledge, skills, and ethical awareness – and their digital citizenship competence across four dimensions: etiquette, safety and security, rights and responsibilities, and online civic engagement. The ultimate objective of the study was to develop a Technology-Driven Civic Learning Framework to guide educators in integrating AI literacy and digital citizenship into Social Studies instruction in Philippine public senior high schools. The study employed a Descriptive-Explanatory Mixed-Methods Design consisting of two sequential phases. In the quantitative phase, a Descriptive-Correlational Design was used to gather and analyze numerical data from 152 Senior High School students enrolled in the Humanities and Social Sciences (SOCIAL STUDIES) strand at Don Jose Integrated High School and Sinalhan Integrated High School. The findings support the hypothesis that higher levels of AI literacy are associated with stronger digital citizenship competence, particularly in ethical, communicative, and civic dimensions. Based on the integrated quantitative and qualitative findings, a Technology-Driven Civic Learning Framework was developed to guide senior high school educators in embedding AI literacy and digital citizenship into Social Studies instruction.

Keywords— AI literacy, digital citizenship competence, senior high school, Social Studies, technology-driven civic learning

I. INTRODUCTION

Artificial intelligence (AI) has drastically changed curriculum materials and classroom methods in the education sector. AI is an emerging field that has changed how people interact on digital platforms and participate in civic activities, impacting social, economic, and educational institutions globally. According to Özüdoğru and Durak (2025), AI is a

rapidly expanding field that is significantly altering the education sector. AI-based technologies are rapidly influencing civic engagement, communication, and information access in modern situations. As a result, educational establishments are essential in providing students with the skills necessary to engage with, assess, and use AI technology in an ethical manner.

According to recent studies, many students exhibit low levels of AI literacy, especially when it comes to assessing information produced by AI (Zebua et al., 2025). Additionally, students' comprehension of the societal ramifications of AI and the moral dilemmas raised by automated procedures is lacking. Comparably, earlier research has shown differences in teenagers' digital citizenship abilities, such as civic involvement, online safety, and moral behavior (Cleofas & Labayo, 2024; Oyedemi, 2020). Despite the fact that the literature now in publication discusses these concepts in general, there is still little actual data regarding their current state in senior high schools in the Philippines.

Examining this topic in the local context is pertinent and urgent given Santa Rosa's fast urbanization and growing digital infrastructure. There is still no actual data on the degree of AI literacy among senior high school social studies students in the city, despite the extensive usage of educational technologies. In order to enable technology-integrated civic learning that enhances critical thinking, ethical reasoning, and active civic involvement, it is imperative to look into students' AI literacy and digital citizenship competencies.

The purpose of this study was to assess senior high school Social Studies students' AI literacy and investigate how it relates to their proficiency in digital citizenship. Understanding the consequences of AI for social narrative building, opinion formation, and value distribution is crucial for SOCIAL STUDIES students, whose coursework encompasses social justice, human rights, and cultural sensitivity. As a result, AI literacy helps them grow and get ready to work as educators, legislators, and advocates in the future.

AI literacy can encourage responsible digital conduct and raise ethical consciousness. Respectful communication, responsibility, and moral civic participation are fundamental tenets of digital citizenship. Students must comprehend how AI systems gather data, produce knowledge, and possibly replicate social injustices in order to achieve these goals. According to this viewpoint, social studies students must be assisted in adopting moral behavior about authorship, privacy, surveillance, intellectual property, and the wider social ramifications of automated technology.

II. METHOD

The conceptual framework highlighted the interaction between the experiences that students had with Technology-Driven Civic Learning in Social Studies courses, which formed their AI Literacy Level and in turn determined their Digital Citizenship Competence.

The research made use of the Input-Process-Output (IPO) model to demonstrate the relationship between the variables. The IPO model emphasized the importance of a sequential chain in the process of transitioning from the AI Literacy Level to Digital Citizenship Competence, leading ultimately to the development of a Technology-Driven Civic Learning Framework. In addition, the IPO model served as the basis for building this framework for technology-driven civic learning.

The multifaceted ability of Senior High School students to comprehend, use, and critically interact with AI systems in academic and civic contexts is known as Artificial Intelligence (AI) Literacy, which is operationalized as the independent variable (IV) in this study. The dependent variable (DV) known as "Digital Citizenship Competence" refers to students' proven capacity to engage in digital environments in a safe, moral, and responsible manner.

The findings of this study facilitated the creation of a framework for technology-driven civic education, providing teachers with practical ways to incorporate artificial intelligence into teaching.

This study used the Descriptive-Explanatory Mixed-Methods Design, involving two phases of research that complemented each other. Specifically, Phase 1 consisted

of gathering numeric data, whereas Phase 2 involved interviewing and discussing issues with selected respondents. The two phases helped in understanding, in depth, the impact of AI Literacy Level on the Digital Citizenship Competence of Senior High School students.

The quantitative phase (Phase 1) involved gathering numerical data to assess senior high school students' levels of the dependent variable (digital citizenship competence) and the independent variable (AI literacy). In order to ascertain the degree to which AI literacy is connected with digital citizenship competency among senior high school students, this

phase also looked at the relationship between the two variables.

Data gathered from one-on-one interviews during the qualitative phase (Phase 2) examined the attitudes and behaviors of a subset of senior high school pupils with regard to their usage of AI. This stage offered comprehensive insights into how students actually interacted with AI technologies.

Table 1: Distribution of Qualitative Interview

Participants by School

School	SHS Social Studies Population	Quantitative Sample	Qualitative Interview Participants
Don Jose Integrated High School	105	64	6
Sinalhan Integrated High School	144	88	6
Total	249	152	12

To guarantee its validity, dependability, and usefulness, the Technology-Driven Civic Learning Framework will go through a methodical validation process. A panel of experts in educational technology, social studies education, artificial intelligence in education, and research methods will perform an expert review to validate the framework.

These specialists will assess the framework according to the applicability of indicators under AI Literacy and

Digital Citizenship Competence, the consistency of the Input-Process-Output structure, and the relevance and clarity of constructs. The framework's operational and conceptual elements will be strengthened and improved with their input. A small sample of Senior High School students who are not part of the main study will also participate in pilot testing. This phase will evaluate the instruments' dependability, usability, and clarity as well as spot any possible implementation problems. To guarantee adequate reliability levels, internal consistency will be assessed using Cronbach's alpha.

Several factors will be used to assess the framework's efficacy. First, construct validity will be established when expert evaluation confirms that AI Literacy as the independent variable and Digital Citizenship Competence as the dependent variable are appropriately defined and operationalized within the framework. Second, if the instruments produce Cronbach's alpha values of at least 0.70, which indicate internal consistency, reliability will be deemed satisfactory. Third, if statistical analysis shows a substantial positive correlation between AI literacy and digital citizenship competence, indicating that greater levels of AI literacy are linked to better digital citizenship results, the framework will be considered effective. Lastly, if educators and students find the framework clear, workable, and helpful for incorporating AI tools into Social Studies curriculum, hence promoting ethical, critical, and responsible digital engagement among learners, then practical applicability will be confirmed.

This study looked at senior high school students' levels of digital citizenship competency and artificial intelligence (AI) literacy. Humanities and Social Sciences (SOCIAL STUDIES) students in grades 11 and 12 who were enrolled at Don Jose Integrated High School and Sinalhan Integrated High School under the Sta. Division of Rosa City Schools. These schools were chosen because of their documented use of instructional technologies and their depiction of urbanizing public secondary education contexts. The study focused on digital citizenship abilities that are pertinent to teaching social studies as well as AI literacy elements, such as knowledge, skills, and ethical awareness. The study examined the benefits and drawbacks of integrating AI into education, especially as it relates to critical thinking, problem-solving, and moral digital participation.

The investigation was constrained by resource and contextual factors. Students' varying access to digital tools, internet connectivity, and device availability may have had an impact on the development of AI literacy and digital citizenship habits. Additionally, self-reported measurements, which could be biased by responses, limited the interpretation of the findings. The results may not accurately reflect differences found in other areas, school types, or academic strands due to the particular socio-educational setting of the chosen schools.

Furthermore, there was insufficient control over external issues including infrastructural gaps, teacher competency in integrating AI, and institutional regulations.

This study was specifically limited to students in the SOCIAL STUDIES strand at two public senior high schools in Sta. Rosa City, so keeping pupils out of private schools and other academic programs. It ignored other fields and more general technology literacies that are not directly related to civic education in favor of concentrating solely on AI literacy and digital citizenship skills pertinent to Social Studies contexts. Additionally, the study did not examine sophisticated technical AI development or programming skills; instead, it limited its investigation to specific aspects of AI literacy, such as knowledge, skills, and ethical awareness. Furthermore, the study's conclusions were not intended to be applied outside of comparable public-school environments with comparable technology integration.

In order to ensure that the results of the study were statistically significant and generalizable, the appropriate sample size was calculated using the Raosoft software, considering several statistical parameters. The probability of error (alpha) was set at 0.05, meaning there was a 5% risk of committing a Type I error. A statistical power of 0.95 was applied, meaning there was a 95% probability of detecting any effects that existed in the population. An effect size of 0.3 was defined, referring to the anticipated moderate level of association between the two variables. Considering all these parameters, the Raosoft calculator determined that a sample size of 152 respondents would be sufficient to obtain statistically significant data. The sample was proportionally allocated to each school based on its senior high school population: Don Jose Integrated High School received an allocation of 64 respondents, and Sinalhan Integrated High School received an allocation of 88 respondents. Respondents were selected using stratified random sampling to ensure proportional representation

across the two schools.

Table 2: Population and Samples

School	Population	Sample
Don Jose Integrated High School	105	64
Sinalhan Integrated High School	144	88
Total	249	152

In line with the objectives of the research, purposive sampling was employed to select twelve (12) senior high school Social Studies students who had participated in the quantitative phase. Participants were chosen from both Don Jose Integrated High School and Sinalhan Integrated High School, with six participants from each school, for a total of twelve interview participants. This sample size was consistent with the guidance of qualitative researchers who recommended a minimum of twelve participants to ensure adequate thematic saturation in phenomenologically oriented studies (Creswell & Poth, 2018). Participants were purposively selected based on their scores in the quantitative phase: specifically, students who obtained the highest scores and those who obtained the lowest scores in both the AI Literacy and Digital Citizenship instruments were prioritized. This criterion ensured that the qualitative phase would illuminate the lived experiences behind both high-performing and low-performing patterns observed in the quantitative data, enabling a more robust and explanatory integration of findings.

This study utilized two research instruments aligned with the Descriptive - Explanatory Mixed-Methods Design. Both instruments underwent expert validation, pilot testing, and revisions to ensure reliability, relevance, and alignment with AI Literacy Level and Digital Citizenship Competence.

Survey Questionnaire (Quantitative Phase). AI Literacy Level served as the independent variable of the study and was operationalized through the survey questionnaire. The instrument evaluated learners' awareness, perceptions, and practices concerning knowledge of AI, AI skills, and ethical awareness. There were four major parts of the survey

questionnaire. The first part gathered personal information from the respondents, including demographic data such as grade level and school affiliation. The second part evaluated AI literacy by assessing students' understanding of fundamental concepts and applications of artificial intelligence. The third part explored attitudes toward digital citizenship through Likert-scale questions measuring students' values, perspectives, and accountability regarding the use of artificial intelligence. The fourth part examined behavior through an analysis of the extent of students' involvement in activities exhibiting responsible digital citizenship and AI applications. Experts in Social Studies and educational research served as validators of the instrument in terms of content validity and appropriateness. Pilot testing was also employed among senior high school students of a nearby school. The reliability coefficient of the survey questionnaire was determined via Cronbach's alpha.

Semi-Structured Interview Guide (Qualitative Phase). The interview guide for Senior High School students explored the extent of Digital Citizenship Competence and the nature of students' AI literacy experiences. The guide allowed the collection of deeper insights regarding artificial intelligence strategies and challenges. Interviews were conducted individually with each of the twelve participants, audio-recorded with participants' consent, and later transcribed verbatim for thematic analysis. The guide was validated by Social Studies specialists and educational researchers.

The study employed both quantitative and qualitative data analysis procedures to ensure comprehensive and accurate interpretation of the findings.

Quantitative Phase. Quantitative data obtained from the survey questionnaire were analyzed using descriptive and inferential statistical techniques. Specifically, Weighted Mean and Standard Deviation were utilized to describe the central tendency and dispersion of respondents' levels of AI literacy and digital citizenship competence in terms of knowledge, attitudes, and behavioral practices. The use of Weighted Mean is appropriate for Likert-scale data as it provides a summarized measure of participants' overall perception, while Standard

Deviation indicates response variability and consistency among respondents.

A 4-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree) was employed as the measurement scale. Interpretation of weighted mean scores followed predetermined verbal interpretation ranges to classify responses from low to high levels of agreement. These interpretive standards ensured consistency and objectivity in evaluating the degree of AI literacy and digital citizenship competence.

For inferential analysis, Spearman's Rho correlation coefficient (ρ) was used to determine the significant relationship between AI Literacy Level (independent variable) and Digital Citizenship Competence (dependent variable). Spearman's Rho was deemed appropriate due to the ordinal nature of Likert-scale data and the potential non-normal distribution of responses. Statistical significance was evaluated at the 0.05 alpha level ($p < .05$), where a p-value lower than the threshold indicates a statistically significant relationship. The strength of correlation was interpreted using established guidelines: negligible, weak, moderate, strong, and very strong association based on coefficient magnitude.

Qualitative Phase. Qualitative data from semi-structured interviews were analyzed using thematic analysis following Braun and Clarke's (2006) six-phase framework. This included familiarization with data, initial coding, theme generation, theme review, theme definition and naming, and report production. Thematic analysis was employed to systematically identify patterns related to students' experiences, practices, and perceptions of AI use and digital citizenship, thereby enriching and contextualizing quantitative findings.

Finally, findings from both quantitative and qualitative phases were integrated through triangulation, enhancing the validity and depth of interpretation and supporting the development of a comprehensive, technology-driven civic learning framework.

Informed consents were obtained from teachers and parents/guardians, while assents were secured from the Senior High School students. Participation in the study was entirely voluntary, and participants could withdraw from the research at any time without penalty or loss of benefits. All information collected

was treated with strict confidentiality in accordance with the Data Privacy Act of 2012 (RA 10173).

III. RESULTS

Findings revealed that students demonstrated a moderate level of AI literacy overall. Among the three dimensions, ethical awareness obtained the highest mean ($M = 3.50$), indicating that students were relatively aware of responsible and ethical AI use. AI skills ($M = 3.09$) and AI knowledge ($M = 3.10$) were assessed at a moderate level, suggesting room for improvement in students' conceptual understanding and practical application of AI tools. In terms of digital citizenship competence, students demonstrated generally high levels across all four dimensions. Rights and responsibilities obtained the highest mean ($M = 3.66$), followed by etiquette ($M = 3.55$), safety and security ($M = 3.53$), and online civic engagement ($M = 3.25$). Spearman's correlation analysis showed a statistically significant positive relationship between AI literacy and select dimensions of digital citizenship competence, particularly between ethical awareness and etiquette ($r = .594$, $p < .001$), ethical awareness and rights and responsibilities ($r = .421$, $p < .001$), skills and etiquette ($r = .352$, $p < .001$), knowledge and etiquette ($r = .324$, $p < .001$), and ethical awareness and online civic engagement ($r = .361$, $p < .001$). These findings support the hypothesis that higher levels of AI literacy are associated with stronger digital citizenship competence, particularly in ethical, communicative, and civic dimensions. Based on the integrated quantitative and qualitative findings, a Technology-Driven Civic Learning Framework was developed to guide senior high school educators in embedding AI literacy and digital citizenship into Social Studies instruction.

IV. DISCUSSION

4.1. What is the AI literacy level of Senior High Social Studies Students in terms of:

4.1.1 Knowledge. The senior high school social studies students showed a moderate level of AI knowledge, with a general assessment mean of 3.10, which is interpreted as Moderately Knowledgeable. The ability to distinguish between a standard search engine and a generative AI tool received the highest

rating ($M = 3.48$, Highly Knowledgeable), while the ability to describe examples of AI applications in government and education ($M = 2.88$) and explain how AI systems learn from large datasets through pattern recognition ($M = 2.81$) received the lowest rating ($M = 2.88$), both of which were rated as Moderately Knowledgeable. This result is consistent with Long and Magerko's (2020) description of AI literacy as a developmental skill that usually starts with functional familiarity before moving on to technical comprehension.

4.1.2. Skills. With a general assessment of 3.09, which is translated as Moderately Skilled, students showed a moderate level of AI-related skills (Table 4). The capacity to modify AI-generated drafts to reflect the student's own voice and perspective was regarded as the lowest skill ($M = 2.91$), while the ability to refine or adjust prompts when an AI response was unclear or irrelevant was scored as the greatest ($M = 3.23$). Both indicators showed a fairly balanced but consistently moderate skill profile, falling within the Moderately Skilled range.

4.1.3. Ethical Awareness. According to Table 5, students showed a high degree of ethical awareness about the employment of AI, with a general mean of 3.50, which is considered Highly Ethically Aware. Understanding that relying too much on AI could hinder one's own skill development was the highest-rated indicator ($M = 3.66$, Highly Ethically Aware), while the idea that using AI in the classroom should encourage accountability, fairness, and honesty was the lowest-rated indicator ($M = 3.31$, Highly Ethically Aware). Interestingly, every signal in this dimension fell into the Highly Ethically Aware range, suggesting that respondents' ethical consciousness was consistently high.

4.2. What is Digital Citizenship Competence among Senior High School Social Studies students in Sta. Rosa City in terms of:

4.2.1. Etiquette. The total mean of 3.55, which is translated as great Etiquette in Table 6, indicates that students exhibited great digital etiquette. The practice of carefully considering one's digital footprint before posting content received the lowest rating ($M = 3.48$, Excellent Etiquette), whereas the habit of carefully considering information before sharing it online received the highest rating ($M =$

3.76, Excellent Etiquette). Every indicator showed a consistently strong inclination toward responsible and polite online behavior, falling inside the Excellent Etiquette level.

4.2.2. Safety / Security. The general mean of 3.53, which is translated as Highly Aware/Secure, in Table 7 indicates that students had a high degree of awareness regarding digital safety. Avoiding publicly disclosing personal information online received the highest rating ($M = 3.68$, Highly Aware/Secure), whereas turning on two-factor authentication when it was available received the lowest rating ($M = 3.31$, Highly Aware/Secure). All indicators came within the Highly Aware/Secure range despite this technological security measure's somewhat lower ranking.

4.2.3. Rights / Responsibilities. The highest mean of all the Digital Citizenship Competence characteristics, 3.66, which is interpreted as Highly Aware/Responsible, indicates that students had a good grasp of their digital rights and duties (Table 8). Understanding that online freedom of expression entails responsibility was the most highly scored indicator ($M = 3.87$, Highly Aware/Responsible), while properly giving credit to writers or creators when using digital resources received the lowest rating ($M = 3.47$, Highly Aware/Responsible). All indicators stayed within the Highly Aware/Responsible range in spite of this relative difference.

4.2.4. Online Civic Engagement. According to Table 9, students showed a moderate level of online civic engagement with a general mean of 3.25, which is translated as Moderately Engaged. This is the lowest score among the four characteristics of Digital Citizenship Competence. Participating in constructive online debates that promote community awareness received the lowest rating ($M = 3.10$, Moderately Engaged), while assessing the reliability of online sources prior to forming opinions received the highest rating ($M = 3.43$, Highly Engaged).

4.3. Is there a significant relationship between the students' AI Literacy Level and their Digital Citizenship Competence?

Ethical Awareness and Etiquette ($\rho = .594$, $p < .001$)
– Behavioral and Cognitive Relationship.

The study found that ethical awareness and etiquette had the biggest link. Students who have a more ethical awareness of AI use are more likely to act conscientiously, respectfully, and mindfully online, according to this moderately favorable link. Although this relationship is behavioral in nature—it shows up in observable online behavior—it is cognitively mediated, with students' ethical reasoning and reflective awareness driving the behavioral consequences. The mechanism underlying this relationship is consistent with moral cognitive theory: students are more likely to apply this ethical framework to their wider online interactions, leading to heightened digital etiquette, when they develop a principled understanding of the ethical implications of their digital actions, including the risks of misinformation, academic dishonesty, and overreliance on AI. This is consistent with Choi et al.'s (2021) empirical finding that online etiquette practices are favorably associated with students' broader civic dispositions and with Akgun and Greenhow's (2022) claim that ethical AI literacy naturally extends to responsible digital behavior across online contexts. This suggests that teaching ethics-centered AI literacy in social studies serves as a high-leverage intervention: teachers can simultaneously improve their students' digital etiquette, which is the cornerstone of polite and responsible engagement in digital civic spaces, by fostering students' ethical reasoning about AI.

Ethical Awareness and Rights/Responsibilities ($\rho = .421$, $p < .001$) – Cognitive Relationship.

Students' knowledge of AI ethics influences their awareness of their own digital rights and duties, as seen by the strong positive link between Ethical Awareness and Rights/Responsibilities. A more sophisticated understanding of the rights and responsibilities that govern digital participation is developed by students who are ethically literate about AI, comprehending topics like data privacy, intellectual property, academic integrity, and the social ramifications of AI-generated content. Here, conceptual generalization serves as the mechanism: ethical AI knowledge, which by its very nature deals with issues of duty, accountability, and justice, gives students a normative vocabulary to apply to their more general digital citizenship conduct. According to Ng et al.'s (2021) framework of AI literacy, AI

ethics is explicitly identified as a domain that includes rights, fairness, and accountability. The strong correlation found here indicates that when students internalize these ethical principles, they translate them into a more prominent sense of personal responsibility in online environments and a stronger digital rights consciousness. This suggests that one of the best ways to improve students' comprehension and application of digital rights and duties is to incorporate conversations about AI ethics, such as intellectual property, data rights, and civic responsibility, into Social Studies lessons.

Ethical Awareness and Online Civic Engagement ($\rho = .361, p < .001$) – Behavioral Relationship.

Students with greater ethical AI knowledge are somewhat but significantly more likely to actively participate in online civic activities, according to the strong positive association between ethical awareness and online civic engagement. Students who comprehend the obligations of digital participation, such as the necessity to critically assess information before acting upon it and to contribute constructively to civic discourse, may be more motivated and prepared to participate actively in online civic spaces. This behavioral relationship functions through an ethical activation mechanism. In the context of senior high school education in the Philippines, this correlation offers empirical evidence for the OECD's (2021) and UNESCO's (2022) emphasis that ethical technology literacy reinforces responsible digital civic involvement. Even though this correlation's modest magnitude ($\rho = .361$) highlights the fact that ethical awareness by itself is insufficient to generate active civic participation, this finding highlights the necessity of structured, participatory civic learning experiences that develop students' self-assurance and competencies for active digital civic engagement.

AI Skills and Etiquette ($\rho = .352, p < .001$) – Behavioral Relationship.

Students with better AI application skills—such as timely refining, source cross-checking, and responsible tool use—tend to behave more cautiously and thoughtfully online, according to the positive link between AI skills and etiquette. A competency transfer mechanism could account for this behavioral relationship: pupils who are more adept at analyzing and utilizing AI-generated content are also more

adept at critical and intentional digital communication, which inevitably shows up as better online manners. This result suggests that developing AI skills should be viewed as both a technical literacy objective and a means of fostering the development of more general digital citizenship.

AI Knowledge and Online Civic Engagement ($\rho = .236, p < .005$) – Cognitive Relationship.

Students who have a better conceptual grasp of AI systems are more likely to participate in online civic activities, according to the positive link between AI Knowledge and Online Civic Engagement. An informed participation mechanism could account for this cognitive relationship: students who comprehend how AI affects information ecosystems, including how algorithms filter and present civic content, may be better equipped to interact critically and purposefully with digital civic information, increasing their likelihood of participating in civic platforms and discussions. This result confirms the claim made by the OECD (2021) that civic engagement in digital environments is enhanced by technology literacy.

A theoretically interesting non-finding is the total lack of statistically meaningful relationships between any aspect of AI literacy and safety/security. This pattern more likely indicates that digital safety behaviors in this student population are habitual and socially acquired, shaped by peer norms, general digital socialization, and parental guidance, rather than being the result of formal AI literacy instruction. This suggests that rather than being anticipated to develop as a result of AI literacy instruction, digital safety competencies would need focused, independent initiatives

4.4. How do students describe their experiences with AI tools and digital technologies in their Social Studies civic learning activities?

4.4.1. The understanding of artificial intelligence and how it functions in the digital tools for schoolwork. According to the qualitative data, students do not view artificial intelligence as a sophisticated sociotechnical system, but rather as a useful, efficient instrument for academic help. Students used terms like "a more humanized version of Google" (Student 4) and "technology that allows computers to learn from data and perform tasks that

usually require human intelligence" (Student 2) to define artificial intelligence. The data revealed four subordinate themes: AI for Academic Task Efficiency and Productivity, AI as an Advanced or Improved Technology, AI as a System That Mimics Human Intelligence, AI as a Source of Information and Knowledge, and AI as a Learning Support Tool.

The prevalence of task-oriented and efficiency-driven conceptualizations of AI indicates that rather than formal instructional engagement with AI as a field of knowledge, students' understanding is mostly molded by their direct user experiences with AI tools. Instead of grasping AI's underlying mechanics, training procedures, or societal ramifications, students view it through the perspective of its outputs, which include its capacity to deliver answers, simplify information, and expedite job completion. The modest Knowledge results ($M = 3.10$) in the quantitative phase are compatible with this experiential epistemology of AI.

4.4.2. The role of artificial intelligence plays in social studies lessons.

Students described AI as a multifunctional educational support system in Social Studies, identifying four principal roles: understanding complex concepts, information and research support, academic task completion, and learning efficiency enhancement. Several students also raised ethical concerns regarding AI misuse, including the risk of students using AI to circumvent academic expectations rather than to facilitate genuine learning.

Students' developing critical literacy about AI's involvement in their learning is reflected in the dual classification of AI as both an educational facilitator and a possible source of academic risk. More advanced AI literacy can be developed on top of this dual awareness. By providing structured learning opportunities to explore the boundaries between appropriate AI assistance and academic misconduct, social studies educators can leverage students' innate ethical concern and help them develop the ability to make morally sound, context-sensitive decisions about AI use in academic and civic contexts.

4.4.3. The method of AI employing tools to finish schoolwork or social studies assignments. Students characterized their usage of AI as mostly directed

and supplemental; they use it as a research tool, concept clarifier, writing enhancer, and prompt-based interactive tool, all the while being mindful of the ethical limits of acceptable AI support. The necessity of employing AI as a guide rather than as a replacement for autonomous thought was a recurring subject in student accounts.

4.5. What are the challenges of responsible AI use in academics?

4.5.1. The difficulties encounter when utilizing AI tools for academic purposes. Six categories of challenges were identified by students in their use of AI in the classroom: technical problems like poor internet connectivity; concerns about plagiarism and originality; inaccurate or unreliable AI outputs; complexity and difficulty in comprehending AI responses; overreliance resulting in diminished critical thinking; and challenges in creating effective prompts. These difficulties reflect a variety of ethical, cognitive, and technical obstacles to responsible AI use.

4.5.2. The ways in which AI tools can be used responsibly for academic purposes. Using AI as a guide rather than a substitute for independent thought, avoiding direct copy-pasting and encouraging original work, limiting overreliance through self-regulation, and maintaining personal comprehension and intellectual engagement with AI-assisted content are the four main tenets of the cohesive and values-driven framework that students developed for responsible AI use.

The high Ethical Awareness scores ($M = 3.50$) found numerically are consistent with the advanced level of ethical self-awareness reflected in the students stated principled framework for responsible AI use. Students have created, at least normatively, a set of personal standards for ethical AI interaction and show a knowledge of the moral and academic consequences of AI misuse. However, students' own admission of instances of overreliance and the continuance of middling skill scores indicate that these ethical ideas have not yet been fully translated into consistent behavioral practice.

4.5.3. The manner in which AI tools employ in an ethical and honest manner for academic assignments. Five thematic categories were used by students to describe their ethical AI use practices:

correctly citing and acknowledging AI-generated content; paraphrasing and expressing in one's own words; verifying and fact-checking AI outputs; strictly using AI as a guide or support tool; and self-regulation to maintain personal comprehension and limit dependence on AI.

4.5.4. The means by which engaging people online in a courteous manner. Four themes emerged from the students' articulation of a set of behavioral principles guiding their online communication: exercising self-control and establishing personal boundaries in online interactions; using courteous and respectful language; respecting the opinions and perspectives of others, even when they disagree; and adhering to established norms of online etiquette, including those introduced through their Media and Information Literacy coursework.

4.6. How do students perceive the role of artificial intelligence in shaping their digital behavior, civic participation and responsible online engagement?

4.6.1. The way in which AI proficiency affects conduct and accountability as digital citizens. Students said that their ability to use AI had both beneficial and possibly detrimental consequences on how they behaved as digital citizens. Increased civic consciousness, better information availability, and improved skill development were among the positive outcomes. The possibility of over-reliance resulting in poorer reading comprehension, diminished critical thinking, and diminished trust in autonomous academic reasoning were among the negative outcomes. Additionally, students showed a greater sense of accountability, realizing that AI literacy involves an ethical duty to apply AI correctly and sensibly.

4.6.2. The effects do digital technologies and AI tools have involvement in social studies civic education activities. Students described AI tools and digital technologies as having both enabling and constraining effects on their participation in civic education. Increased understanding of various civic viewpoints, improved engagement with social and political concerns, and easier access to civic information were all enabling impacts. The possibility of over-reliance, exposure to skewed or algorithmically filtered information, and the possibility that AI-generated content may spread

false information or encourage blind acceptance of public opinions were among the limiting impacts.

4.7. What Technology-Driven Civic Learning Framework can be developed based on the integrated findings?

CIVIC-AI Model. In an effort to provide a theoretically sound and data-driven framework for incorporating artificial intelligence into social studies training, this framework summarizes the empirical results from both the quantitative and qualitative phases of this study. The suggested framework, known as the CIVIC-AI Model, views AI as an auxiliary cognitive tool that enhances inquiry, encourages critical analysis, and enables meaningful civic engagement among students rather than assuming that technological systems will replace human cognition. The CIVIC-AI Model, which reflects the epistemological commitments of the mixed-methods research methodology used in this work, directly resulted from the convergence of statistically significant quantitative data and richly descriptive qualitative themes.

The themes found in the qualitative phase, such as AI as a Cognitive Enhancement Tool, Ethical Awareness and Responsible Use of AI, and Civic Disengagement Despite Digital Awareness, which explain how students apply AI knowledge in ethical digital behavior, and the significant relationship between AI literacy and digital citizenship (quantitative findings) served as the basis for the proposed framework.

Connect, Investigate, Validate, Interact, and Contribute are the five interrelated parts of the CIVIC-AI Model, which are coupled by a cross-cutting AI Integration Layer. In order to ensure that the suggested model is responsive to the observed learning needs, competency gaps, and ethical orientations of the student participants, every component of the framework is clearly rooted in the empirical evidence produced through this study. Each framework component is thoroughly described in the parts that follow, together with its theoretical justification and foundation in the quantitative and qualitative findings.

V. CONCLUSION

Based on the findings of the study, the following conclusions were drawn. First, Students' level of AI

literacy was modest but primarily functional, with low conceptual and technical depth and a practical acquaintance with AI technologies. Although effective for completing tasks, this operational competency proved insufficient for the critical and analytical engagement with AI necessary for responsible digital citizenship in increasingly AI-mediated civic environments.

Second, the lack of consistent critical thinking when using these tools revealed a tendency toward cognitive offloading—an over-reliance on AI for information retrieval without using it as a tool for solving complex problems or developing higher-order analytical competencies—even though students had AI-related skills adequate for everyday academic use.

Third, the most notable strength among students was ethical awareness, as evidenced by their sophisticated, spontaneous understanding of the ethical implications of AI. This shows that ethical AI education has made significant progress through Social Studies and Media and Information Literacy curricula. The existence of ethical awareness did not, however, guarantee that it would consistently translate into morally sound behavior.

Fourth, Social Studies students in their senior year of high school showed a high level of general competency in digital citizenship, with a focus on rights and responsibilities, safety and security, and manners. These characteristics demonstrated deeply ingrained behavioral tendencies that continuously encouraged responsible, courteous, and rights-aware internet interaction.

Fifth, the weakest aspect of digital citizenship competency was online civic engagement, which showed that students were primarily passive consumers of digital civic content rather than active contributors, advocates, or agents of civic change, despite their general civic awareness and possession of pertinent participatory skills.

Sixth, the majority of digital citizenship dimensions and AI literacy were shown to have a statistically significant positive association, with ethical awareness showing the strongest correlation. According to this research, the most effective pedagogical tool for improving digital citizenship outcomes among Senior High School Social Studies

students is the development of ethical AI literacy.

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